

*Test pressure* means the pressure to which a tank is subjected to determine structural integrity.

*Toughness of material* means the capability of a material to absorb energy represented by the area under a stress strain curve (indicating the energy absorbed per unit volume of the material) up to the point of rupture.

*Vacuum cargo tank* means a cargo tank that is loaded by reducing the pressure in the cargo tank to below atmospheric pressure.

*Variable specification cargo tank* means a cargo tank that is constructed in accordance with one specification, but that may be altered to meet another specification by changing relief device, closures, lading discharge devices, and other lading retention devices.

*Void* means the space between tank heads or bulkheads and a connecting structure.

*Welded flange* means a flange attached to the tank by a weld joining the tank shell to the cylindrical outer surface of the flange, or by a fillet weld joining the tank shell to a flange shaped to fit the shell contour.

(b) *Design certification.* (1) Each cargo tank or cargo tank motor vehicle design type, including its required accident damage protection device, must be certified to conform to the specification requirements by a Design Certifying Engineer who is registered in accordance with subpart F of part 107 of this title. An accident damage protection device is a rear-end protection, overturn protection, or piping protection device.

(2) The Design Certifying Engineer shall furnish to the manufacturer a certificate to indicate compliance with the specification requirements. The certificate must include the sketches, drawings, and calculations used for certification. Each certificate, including sketches, drawings, and calculations, shall be signed by the Design Certifying Engineer.

(3) The manufacturer shall retain the design certificate at his principal place of business for as long as he manufactures DOT specification cargo tanks.

(c) *Exceptions to the ASME Code.* Unless otherwise specified, when exceptions are provided in this subpart from

compliance with certain paragraphs of the ASME Code, compliance with those paragraphs is not prohibited.

[Amdt. 178-89, 55 FR 37055, Sept. 7, 1990, as amended by Amdt. 178-98, 58 FR 33306, June 16, 1993; Amdt. 178-118, 61 FR 51339, Oct. 1, 1996; 68 FR 19277, Apr. 18, 2003; 68 FR 52370, Sept. 3, 2003; 68 FR 75752, Dec. 31, 2003]

**§ 178.337 Specification MC 331; cargo tank motor vehicle primarily for transportation of compressed gases as defined in subpart G of part 173 of this subchapter.**

**§ 178.337-1 General requirements.**

(a) *ASME Code construction.* Tanks must be—

(1) Seamless or welded construction, or a combination of both;

(2) Designed, constructed, certified, and stamped in accordance with Section VIII of the ASME Code (IBR, see § 171.7 of this subchapter);

(3) Made of steel or aluminum; however, if aluminum is used, the cargo tank must be insulated and the hazardous material to be transported must be compatible with the aluminum (see §§ 178.337-1(e)(2), 173.315(a) table, and 178.337-2(a)(1) of this subchapter); and

(4) Covered with a steel jacket if the cargo tank is insulated and used to transport a flammable gas (see § 173.315(a) table Note 11 of this subchapter).

(b) *Design pressure.* The design pressure of a cargo tank authorized under this specification shall be not less than the vapor pressure of the commodity contained therein at 115 °F. or as prescribed for a particular commodity in § 173.315(a) of this subchapter, except that in no case shall the design pressure of any cargo tank be less than 100 p.s.i.g. nor more than 500 p.s.i.g.

NOTE 1: The term *design pressure* as used in this specification, is identical to the term *MAWP* as used in the ASME Code.

(c) *Openings.* (1) Excess pressure relief valves shall be located in the top of the cargo tank or heads.

(2) A chlorine cargo tank shall have only one opening. That opening shall be in the top of the cargo tank and shall be fitted with a nozzle that meets the following requirements:

(i) On a cargo tank manufactured on or before December 31, 1974, the nozzle

shall be protected by a dome cover plate which conforms to either the standard of The Chlorine Institute, Inc., Dwg. 103-3, dated January 23, 1958, or to the standard specified in paragraph (c) (2) (ii) of this section.

(ii) On a cargo tank manufactured on or after January 1, 1975, the nozzle shall be protected by a manway cover which conforms to the standard of The Chlorine Institute, Inc., Dwg. 103-4, dated September 1, 1971.

(d) *Reflective design.* Every uninsulated cargo tank permanently attached to a cargo tank motor vehicle shall, unless covered with a jacket made of aluminum, stainless steel, or other bright nontarnishing metal, be painted a white, aluminum or similar reflecting color on the upper two-thirds of area of the cargo tank.

(e) *Insulation.* (1) Each cargo tank required to be insulated must conform with the use and performance requirements contained in §§173.315(a) table and 178.337-1 (a)(3) and (e)(2) of this subchapter.

(2) Each cargo tank intended for chlorine; carbon dioxide, refrigerated liquid; or nitrous oxide, refrigerated liquid service must have suitable insulation of such thickness that the overall thermal conductance is not more than 0.08 Btu per square foot per °F differential per hour. The conductance must be determined at 60 °F. Insulation material used on cargo tanks for nitrous oxide, refrigerated liquid must be noncombustible. Insulating material used on cargo tanks for chlorine must be corkboard or polyurethane foam, with a minimum thickness of 4 inches, or 2 inches minimum thickness of ceramic fiber/fiberglass of 4 pounds per cubic foot minimum density covered by 2 inches minimum thickness of fiber.

(f) *Postweld heat treatment.* Postweld heat treatment must be as prescribed in the ASME Code except that each cargo tank constructed in accordance with Part UHT of Section VIII of the ASME Code must be postweld heat treated. Each chlorine cargo tank must be fully radiographed and postweld heat treated in accordance with the provisions in Section VIII of the ASME Code under which it is constructed. Where postweld heat treatment is required, the cargo tank must be treated

as a unit after completion of all the welds in and/or to the shells and heads. The method must be as prescribed in Section VIII of the ASME Code. Welded attachments to pads may be made after postweld heat treatment. A cargo tank used for anhydrous ammonia must be postweld heat treated. The postweld heat treatment must be as prescribed in Section VIII of the ASME Code, but in no event at less than 1,050 °F cargo tank metal temperature.

(g) *Definitions.* The following definitions apply to §§178.337-1 through 178.337-18:

*Emergency discharge control* means the ability to stop a cargo tank unloading operation in the event of an unintentional release. Emergency discharge control can utilize passive or off-truck remote means to stop the unloading operation. A passive means of emergency discharge control automatically shuts off the flow of product without the need for human intervention within 20 seconds of an unintentional release caused by a complete separation of the liquid delivery hose. An off-truck remote means of emergency discharge control permits a qualified person attending the unloading operation to close the cargo tank's internal self-closing stop valve and shut off all motive and auxiliary power equipment at a distance from the cargo tank motor vehicle.

*Excess flow valve, integral excess flow valve, or excess flow feature* means a component that will close automatically if the flow rate of a gas or liquid through the component reaches or exceeds the rated flow of gas or liquid specified by the original valve manufacturer when piping mounted directly on the valve is sheared off before the first valve, pump, or fitting downstream from the valve.

*Internal self-closing stop valve* means a primary shut off valve installed in a product discharge outlet of a cargo tank and designed to be kept closed by self-stored energy.

*Primary discharge control system* means a primary shut-off installed at a product discharge outlet of a cargo tank consisting of an internal self-closing stop valve that may include an integral excess flow valve or an excess flow feature, together with linkages

that must be installed between the valve and remote actuator to provide manual and thermal on-truck remote means of closure.

[Order 59-B, 30 FR 579, Jan. 16, 1965. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 178.337-1, see the List of CFR Sections Affected which appears in the Finding Aids section of the printed volume and on GPO Access.

#### § 178.337-2 Material.

(a) *General.* (1) All material used for construction of the cargo tank and appurtenances must be suitable for use with the commodities to be transported therein and must conform to the requirements in Section II of the ASME Code (IBR, see § 171.7 of this subchapter) and/or requirements of the American Society for Testing and Materials in all respects.

(2) Impact tests are required on steel used in the fabrication of each cargo tank constructed in accordance with part UHT in Section VIII of the ASME Code. The tests must be made on a lot basis. A lot is defined as 100 tons or less of the same heat treatment processing lot having a thickness variation no greater than plus or minus 25 percent. The minimum impact required for full size specimens must be 20 foot-pounds in the longitudinal direction at  $-30^{\circ}\text{F.}$ , Charpy V-Notch and 15 foot-pounds in the transverse direction at  $-30^{\circ}\text{F.}$ , Charpy V-Notch. The required values for subsize specimens must be reduced in direct proportion to the cross-sectional area of the specimen beneath the notch. If a lot does not meet this requirement, individual plates may be accepted if they individually meet this requirement.

(3) The fabricator shall record the heat, and slab numbers, and the certified Charpy impact values, where required, of each plate used in each cargo tank on a sketch showing the location of each plate in the shell and heads of the cargo tank. Copies of each sketch shall be provided to the owner and retained for at least five years by the fabricator and made available to duly identified representatives of the Department of Transportation.

(4) The direction of final rolling of the shell material shall be the circum-

ferential orientation of the cargo tank shell.

(b) *For a chlorine cargo tank.* Plates, the manway nozzle, and anchorage shall be made of carbon steel which meets the following requirements:

(1) For a cargo tank manufactured on or before December 31, 1974—

(i) Material shall conform to ASTM A 300, "Steel Plates for Pressure Vessels for Service at Low Temperatures" (IBR, see § 171.7 of this subchapter);

(ii) Material shall be Class 1, Grade A, flange or firebox quality;

(iii) Plate impact test specimens, as required under paragraph (a) of this section, shall be of the Charpy keyhole notch type; and

(iv) Plate impact test specimens shall meet the impact test requirements in paragraph (a) of this section in both the longitudinal and transverse directions of rolling at a temperature of minus  $45.5^{\circ}\text{C.}$  ( $-50^{\circ}\text{F.}$ ).

(2) For a cargo tank manufactured on or after January 1, 1975—

(i) Material shall conform to ASTM A 612 (IBR, see § 171.7 of this subchapter), Grade B or A 516/A 516M (IBR, see § 171.7 of this subchapter), Grade 65 or 70;

(ii) Material shall meet the Charpy V-notch test requirements of ASTM A 20/A 20M (IBR, see § 171.7 of this subchapter); and

(iii) Plate impact test specimens shall meet the impact test requirements in paragraph (a) of this section in both the longitudinal and transverse directions of rolling at a temperature of minus  $40^{\circ}\text{C.}$  ( $-40^{\circ}\text{F.}$ ).

(c) A cargo tank in anhydrous ammonia service must be constructed of steel. The use of copper, silver, zinc or their alloys is prohibited. Baffles made from aluminum may be used only if joined to the cargo tank by a process not requiring postweld heat treatment of the cargo tank.

[Order 59-B, 30 FR 579, Jan. 16, 1965. Redesignated at 32 FR 5606, Apr. 5, 1967]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 178.337-2, see the List of CFR Sections Affected which appears in the Finding Aids section of the printed volume and on GPO Access.

#### § 178.337-3 Structural integrity.

(a) General requirements and acceptance criteria. (1) Except as provided in